Fresh and hardened properties of palm oil clinker lightweight aggregate concrete incorporating Nano-palm oil fuel ash

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ABSTRACT

The lack of alternative materials for cement has led to the emission of a huge quantity of CO_2 and a high consumption of energy, both being the consequences of cement production. In this research, two types of solid agricultural wastes have been adopted, namely, palm oil clinker (POC) and Nano palm oil fuel ash (NPOFA) as coarse aggregate and cement replacement in various proportions, respectively. POC has been used as partial and full replacement of traditional coarse aggregate while NPOFA has been used as partial replacement of ordinary Portland cement (OPC) ranging between 0% and 30%. The aim of this study is to reduce the cement quantity in POC lightweight concrete as well as to show the effect of NPOFA on the POC concrete properties. The results show that the inclusion of NPOFA up to 30% improves the workability of concrete as well as the compressive strength and UPV gradually. In addition to that, NPOFA has a positive effect on the water absorption. Overall, the concrete containing NPOFA and POC aggregates can enhance the sustainability aspect in the concrete production as well as reduce the CO_2 gas emission into the atmosphere.

KEYWORDS

Solid agricultural wastes; Palm oil clinker (POC); Palm oil fuel ash (POFA); Nano-POFA; Sustainability; CO2 emission

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